



DARK ENERGY
SURVEY

DES Calibration Fields

Douglas L. Tucker

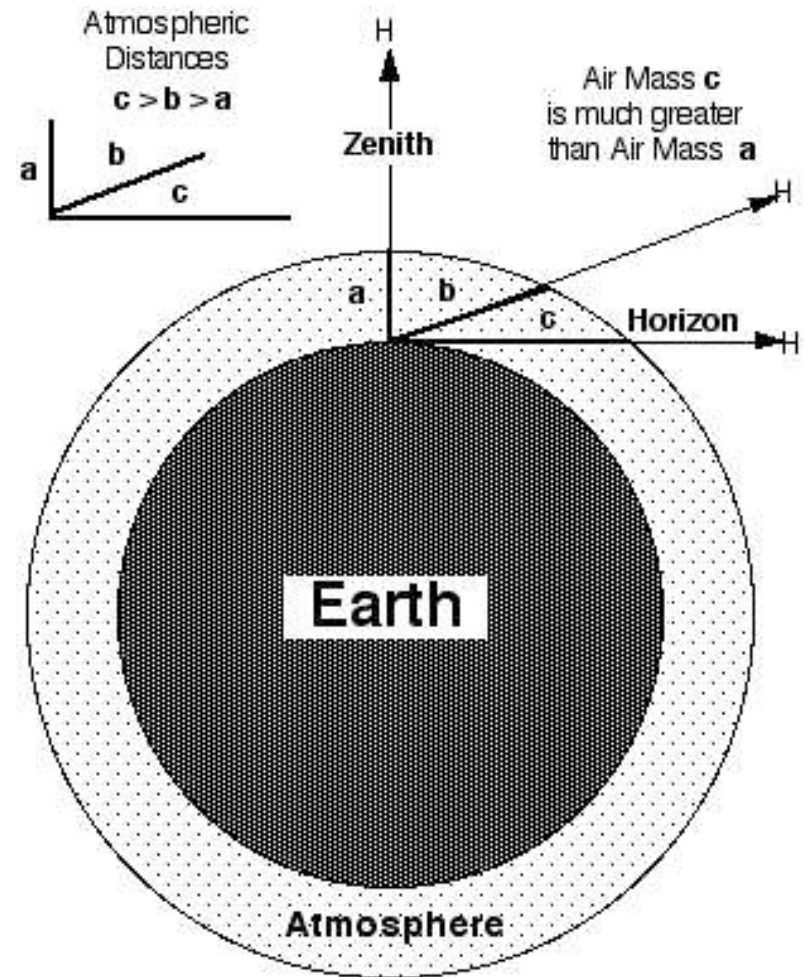
DES SNWG Telecon
16 May 2011



Nightly/Intermediate Calibrations: Standard Star Observing Strategy

DARK ENERGY
SURVEY

- Observe 3 standard star fields, each at a different airmass ($X=1-2$), between nautical (12°) and astronomical (18°) twilight (evening and morning).
- In the course of observing normal science exposures, the DES main survey will also cross over fields from the PreCam Survey about 5x a night.
- Also can observe standard star fields when sky is photometric but seeing is too poor for science imaging (seeing > 1.1 arcsec)
- Use fields with multiple standard stars (to cover focal plane and to cover a wide range of colors)
- Keep an eye on the photometricity monitors

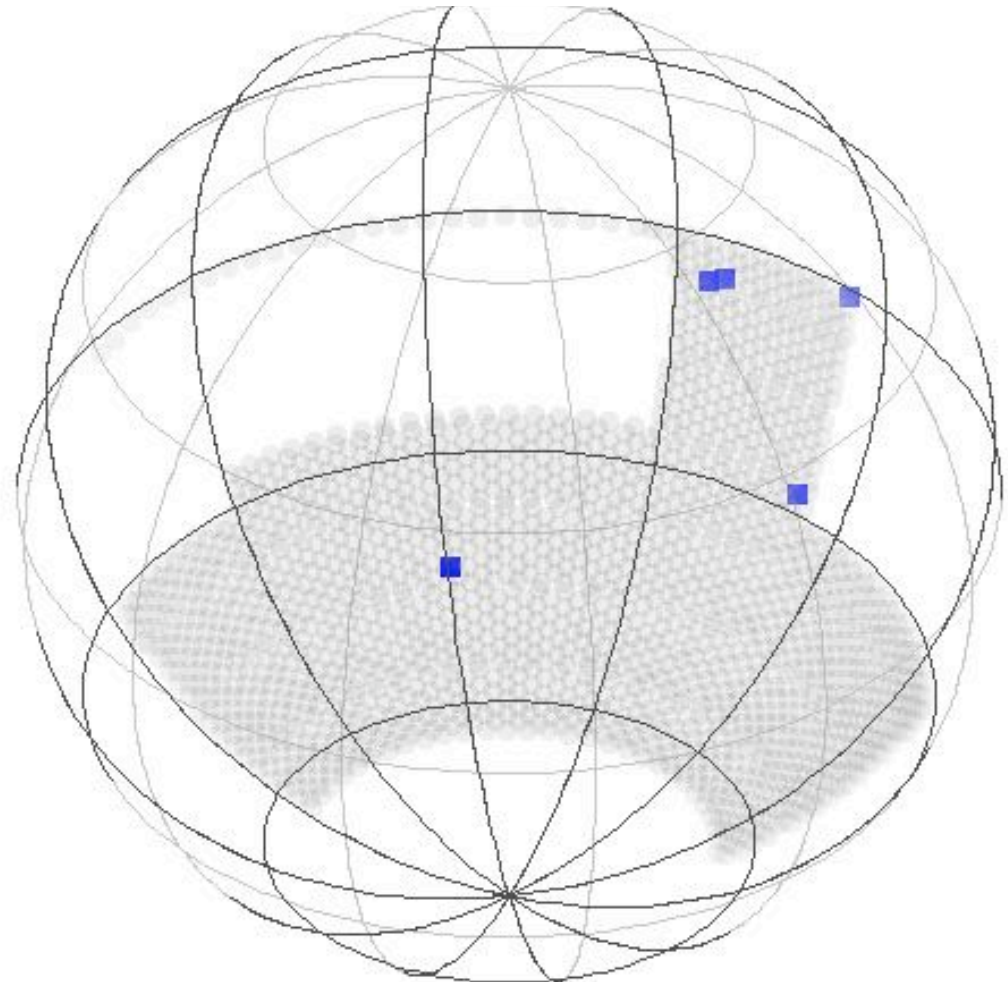


Airmass $X \approx \sec Z$
 $X=1$ overhead, $X=2$ at $Z=60^\circ$



DARK ENERGY
SURVEY

Nightly/Intermediate Calibrations: Standard Stars for DES



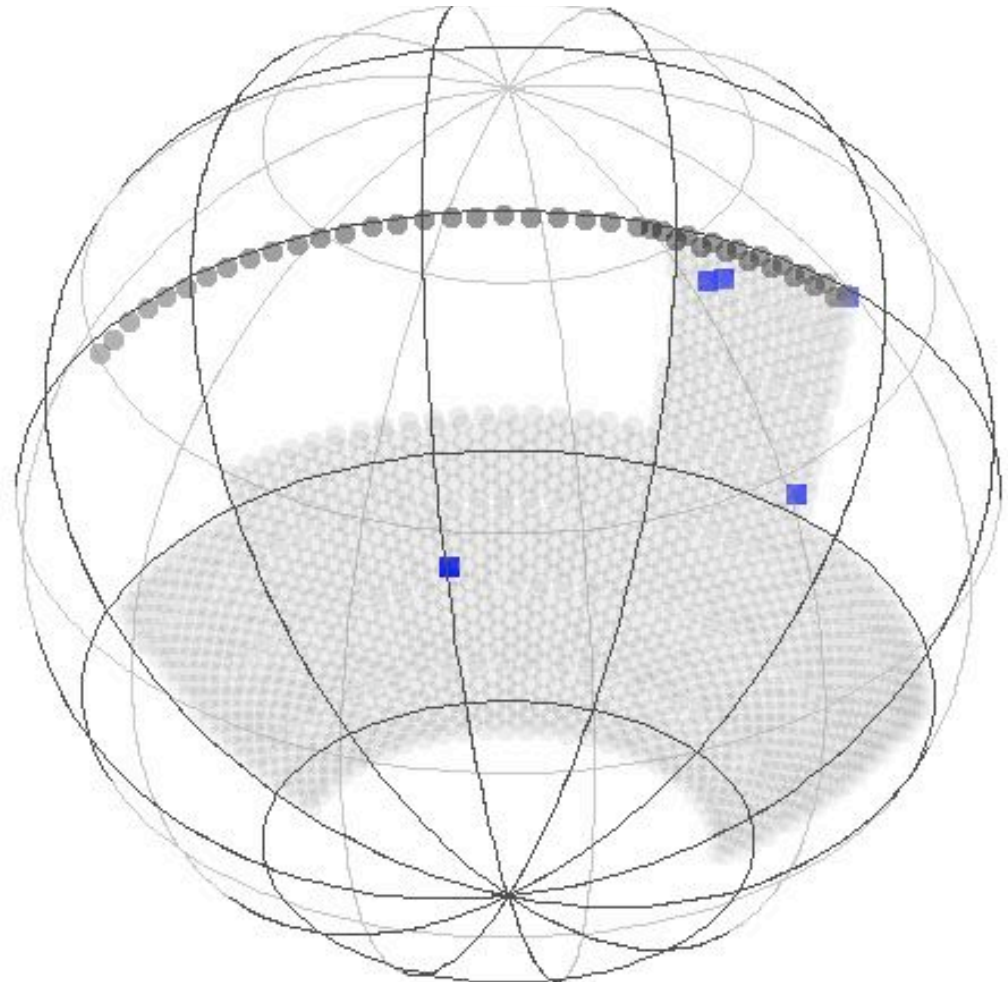


DARK ENERGY
SURVEY

Nightly/Intermediate Calibrations: Standard Stars for DES

SDSS Stripe 82

- $\sim 10^6$ tertiary *ugriz* standards
- $r = 14.5\text{-}21$
- ~ 4000 per sq deg
- $2.5^\circ \times 100^\circ$ area
- See Ivezić et al. (2007)





DARK ENERGY
SURVEY

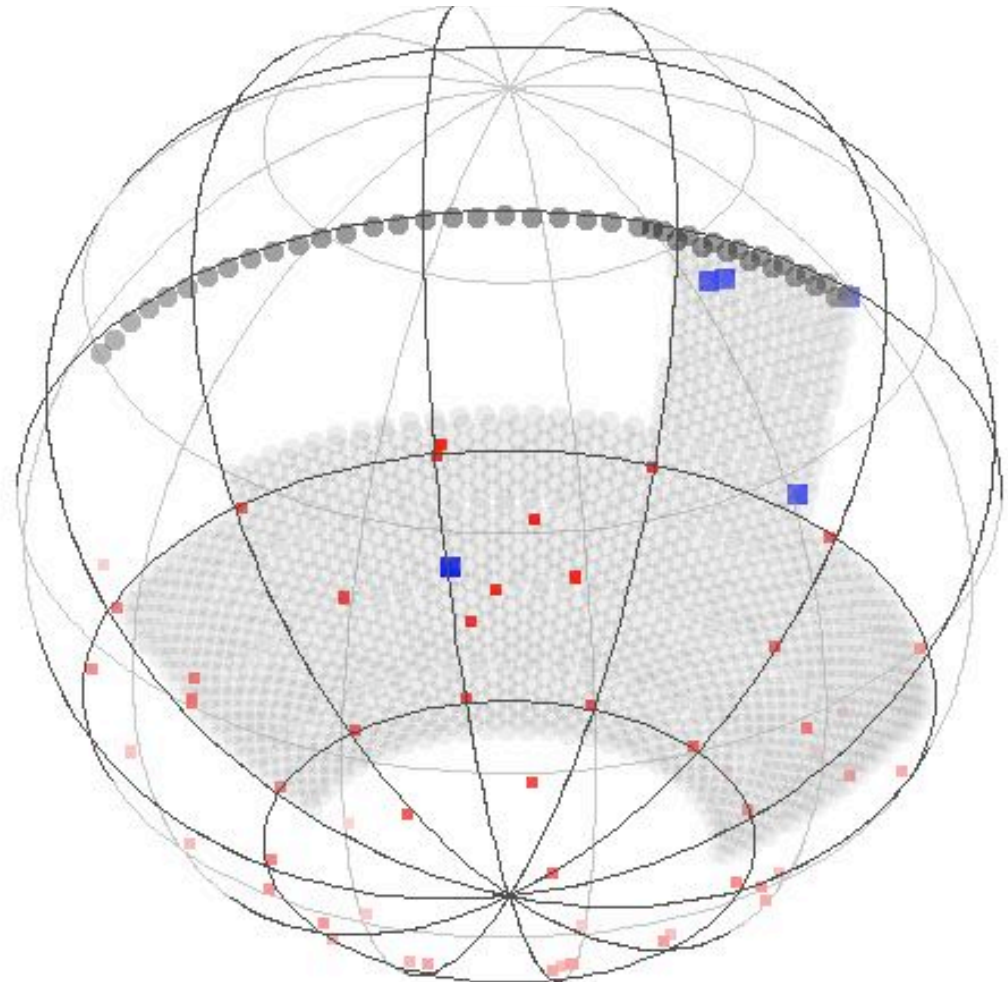
Nightly/Intermediate Calibrations: Standard Stars for DES

SDSS Stripe 82

- $\sim 10^6$ tertiary *ugriz* standards
- $r = 14.5\text{--}21$
- ~ 4000 per sq deg
- $2.5^\circ \times 100^\circ$ area
- See Ivezić et al. (2007)

Southern *u'g'r'i'z'* Standards

- Sixty $13.5' \times 13.5'$ fields
- $r = 9\text{--}18$
- Typically tens per field
- See http://www-star.fnal.gov/Southern_ugriz/





DARK ENERGY
SURVEY

Nightly/Intermediate Calibrations: Standard Stars for DES

SDSS Stripe 82

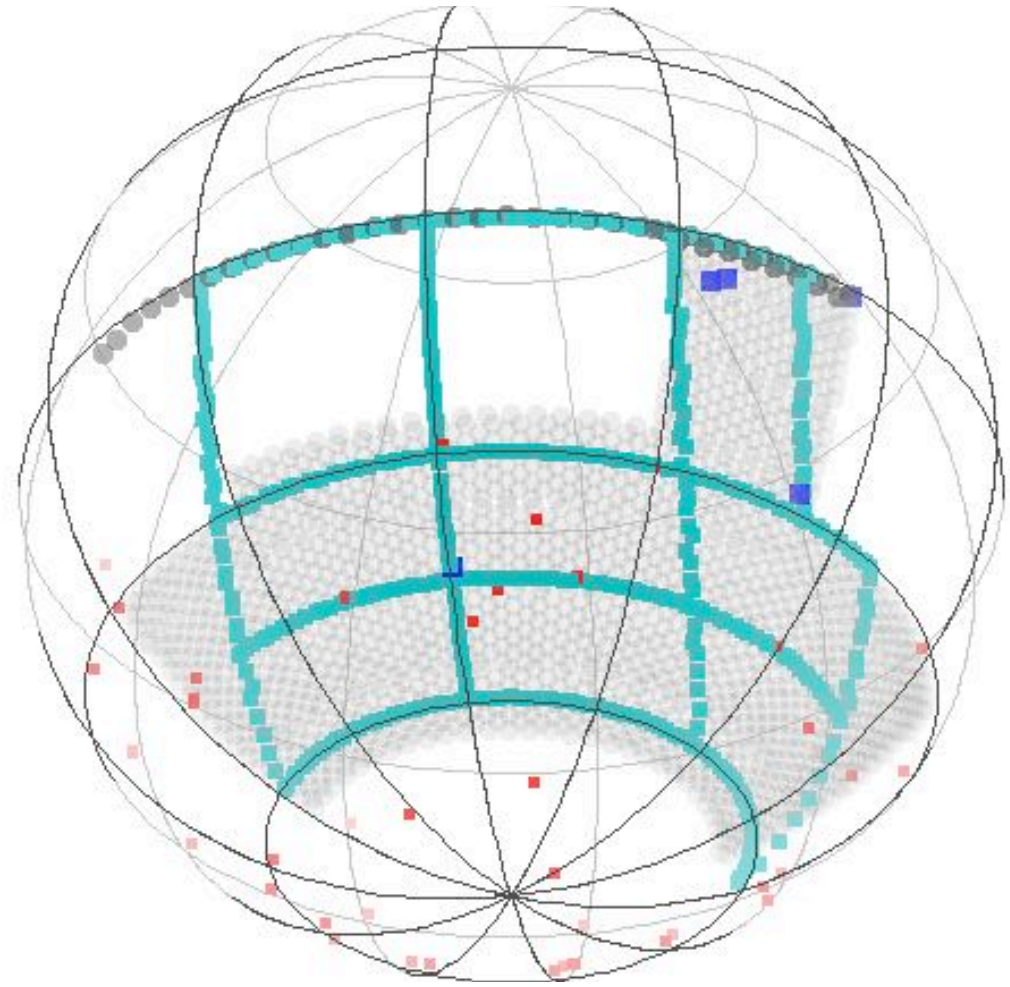
- $\sim 10^6$ tertiary *ugriz* standards
- $r = 14.5\text{--}21$
- ~ 4000 per sq deg
- $2.5^\circ \times 100^\circ$ area
- See Ivezić et al. (2007)

Southern *u'g'r'i'z'* Standards

- Sixty $13.5' \times 13.5'$ fields
- $r = 9\text{--}18$
- Typically tens per field
- See http://www-star.fnal.gov/Southern_ugriz/

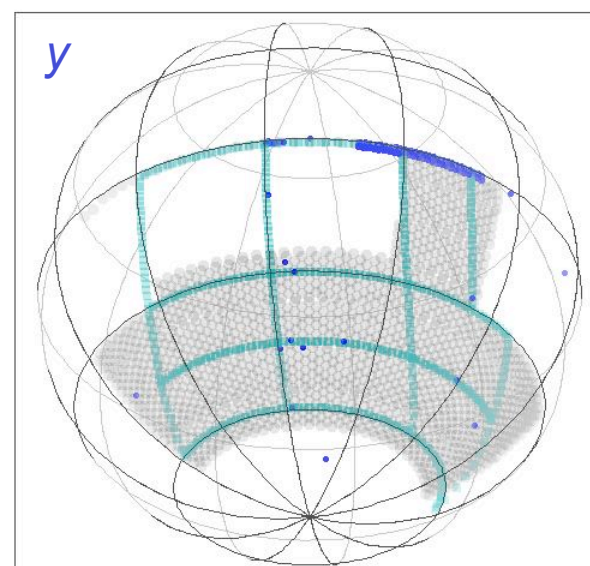
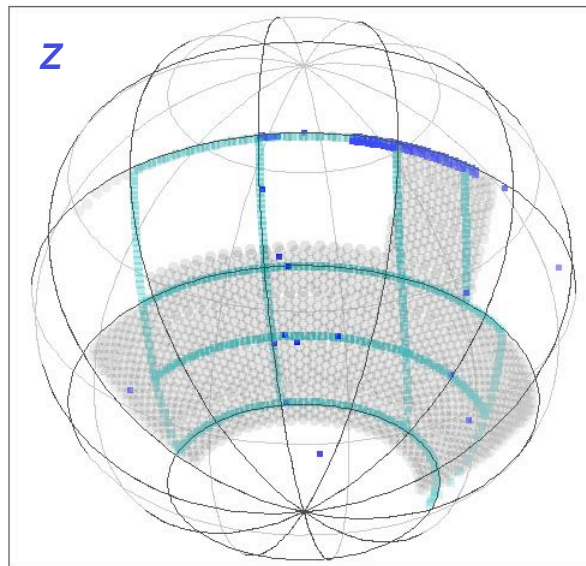
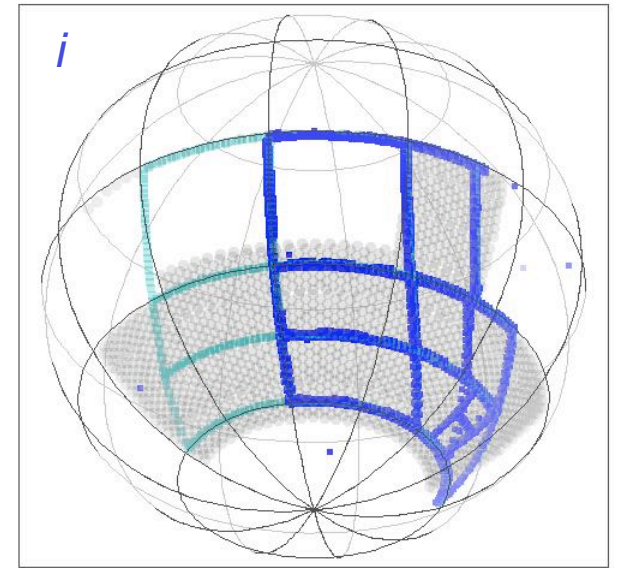
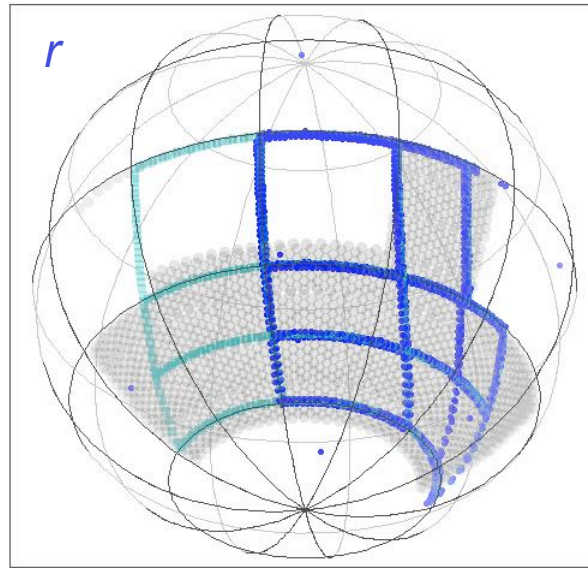
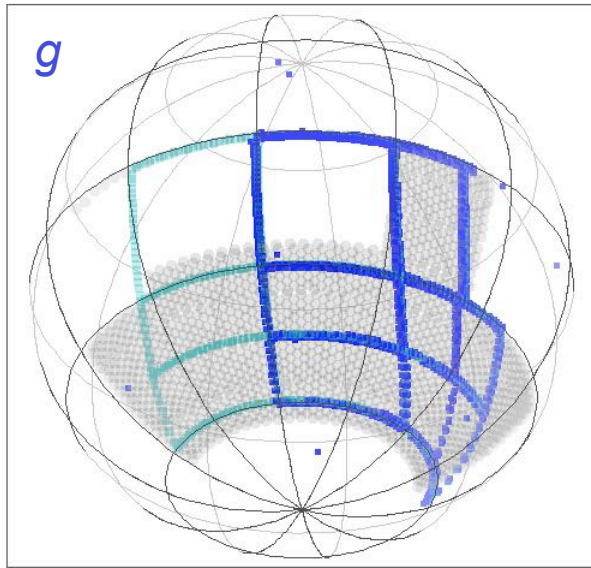
PreCam

- DES *grizy*
- 500 sq deg
- $1.6^\circ \times 1.6^\circ$ FOV
- ≈ 200 per sq deg to $r \approx 17.8$





Actual PreCam Coverage as of Jan 20





DARK ENERGY
SURVEY

Recommendations from the May 10-11, 2011 DES Review

6.2 Calibration

Recommendations

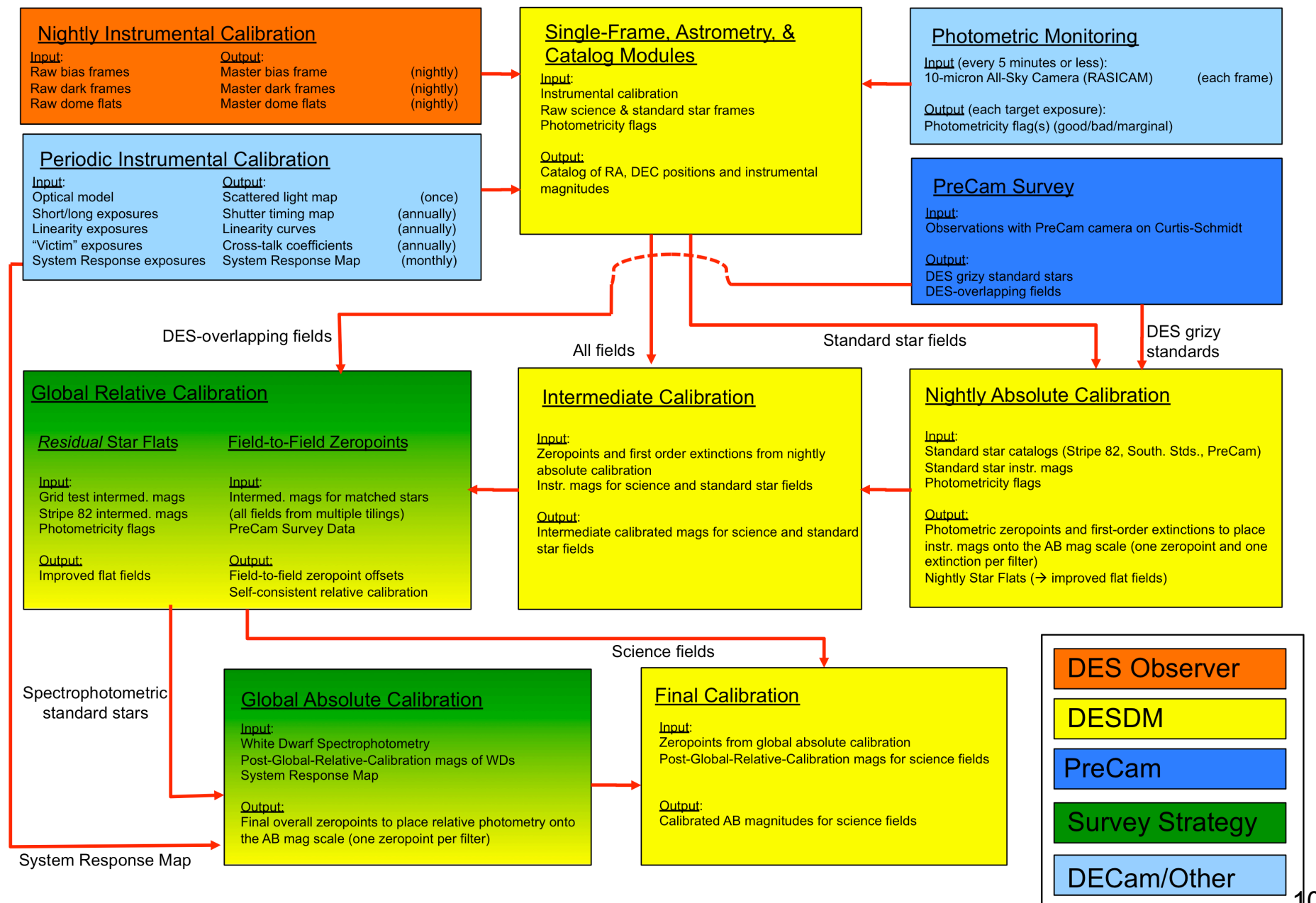
- Plan for two PreCam campaigns—one in winter 2012 to fill in z,Y in the eastern part of the DES footprint and a longer one in 2012-2013 to finish the grid in all filters
- Carefully isolate the work allocation of individuals between PreCam observing/analysis and DECam installation and commissioning.
- Develop procedures to test the quality of the calibration—this will also enable commissioning of the DESDM.



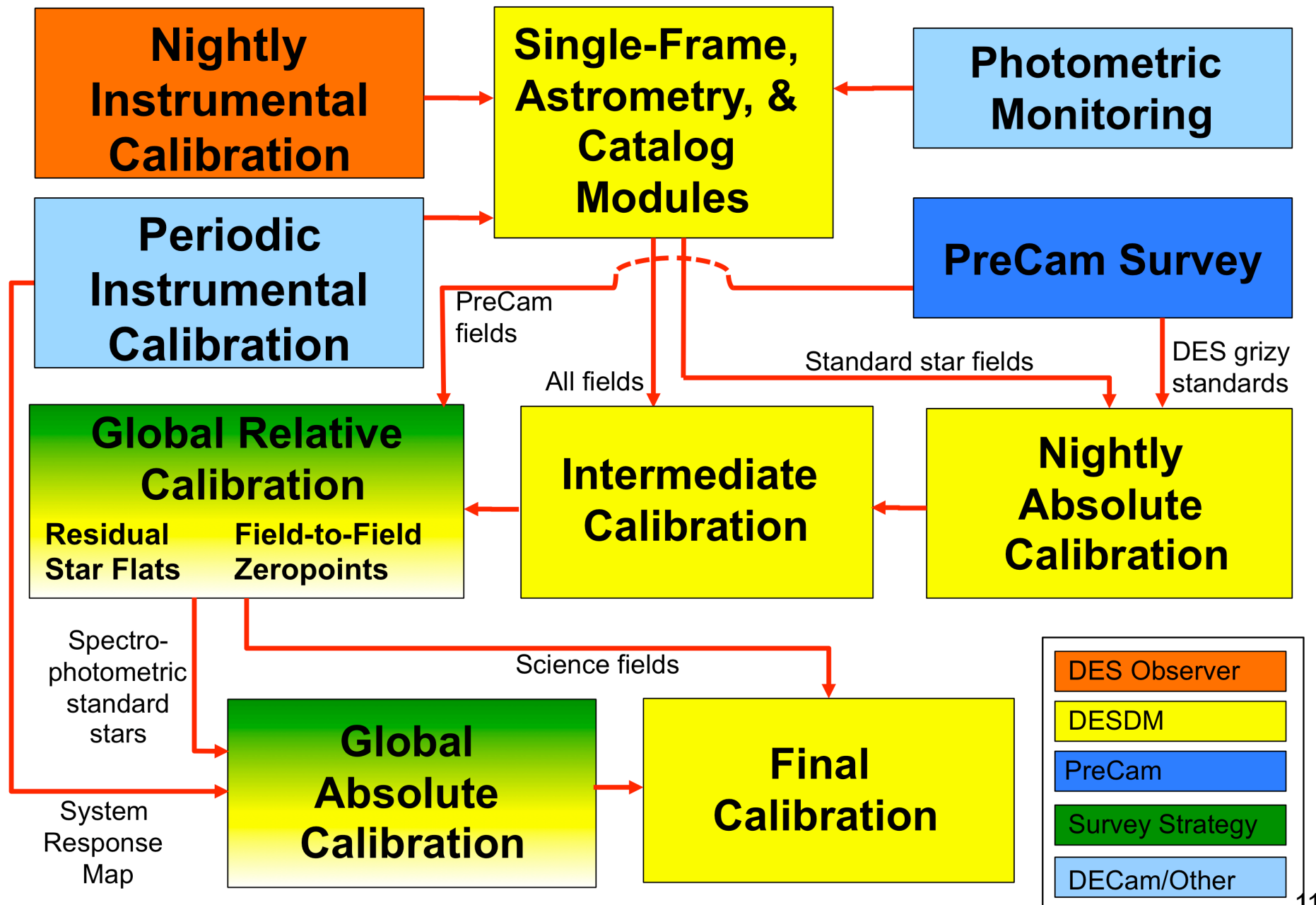
DARK ENERGY
SURVEY

Extra Slides

DES Photometric Calibrations Flow Diagram (v4.1)



DES Photometric Calibrations Flow Diagram (v4.1)





DARK ENERGY
SURVEY

Nightly/Intermediate Calibrations: PreCam *grizy* Standards

**Baseline PreCam Survey Point-Source Magnitude Limits
(optimized to achieve S/N=50 at DES saturation + 1.5mag)**

Band	PreCam Exposure Time [seconds]	PreCam saturation limit	DES saturation limit (100s exposure)	PreCam mag limit (S/N=50)	PreCam detection/ mag limit (S/N=5)	# Stars per sq deg, DES sat to PreCam S/N=50)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
g	36	12.8	16.3	17.8	20.9	186
r	51	13.2	16.3	17.8	20.7	265
i	65	13.4	16.2	17.7	20.5	344
z	162	14.1	16.0	17.5	20.1	317
Y	73	11.6	14.3	15.8	18.5	150

**PreCam increases the sample of DES y-band standards
from effectively zero standards to > 150 per sq deg**